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LISTS OF SPECIES

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Updated list of anurans from Floresta Nacional Mário Xavier, Seropédica, Rio de Janeiro, Brazil: changes from 1990 to 2012

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Abstract: The Floresta Nacional Mário Xavier (FNMX) is a reserve located in the Municipality of Seropédica, State of Rio de Janeiro, southeastern Brazil. It is an area with intense anthropic activity and is one of the last remaining forests of the Baixada Fluminense. An inventory of the anurans of the FNMX was performed and the results compared with those of a previous species list for the area. Thirteen excursions were conducted, totaling more than 416 hours of sampling effort. Twenty-six species belonging to five families were found: Bufonidae (one species), Hylidae (15 species), Leptodactylidae (six species), Microhylidae (three species) and Phyllomedusidae (one species). Six species on the previous list were not found in this study. *Sphaenorhynchus planicola* is a new record for the area. Two species are endangered: *Chiasmocleis lacrimae* and *Physalaemus soaresi*, the latter being considered critically endangered by the List of Brazilian Fauna Threatened with Extinction.

Key words: Lowland Atlantic Forest; Amphibia; conservation; decline; disappearing populations; inventory

INTRODUCTION

Long-term data about species populations are important to conservation issues such as understanding amphibian declines (e.g., Laurance et al. 1996; Storfer 2003; Eterovick et al. 2005; Rantala et al. 2015). Because habitat loss is the major threat to amphibian populations in the Neotropics (Stuart et al. 2004), long-term field studies in severely fragmented areas are of fundamental importance for amphibian conservation (Becker et al. 2007).

The Floresta Nacional Mário Xavier (Mário Xavier National Forest, FNMX) is a federal forest reserve constantly exposed to pollution from intense anthropic activity, traffic and disorderly occupation in the vicinity. Izecksohn and Carvalho-e-Silva (2001a) published an amphibian species list for FNMX using data collected between 1963 and 1990. Thirty-two species were recorded (Table 1), four of these having FNMX as the type locality: *Stereocyclops parkeri*, *Dendropsophus pseudomeridianus*, *Chiasmocleis lacrimae* [referred to as *Chiasmocleis carvalhoi*; see Peloso et al. (2014) for taxonomic discussion], and *Physalaemus soaresi*. The last two are listed as Endangered by IUCN (2015) and *P. soaresi* is also listed as Critically Endangered by the List of Brazilian Fauna Threatened with Extinction (ICMBIO 2014). Furthermore, *Allobates olfersioides* is also listed as Vulnerable by both IUCN (2015) and List of Brazilian Fauna Threatened with Extinction (ICMBIO 2014).

Recently the anthropic impacts on FNMX increased with the construction of a highway that passes through the reserve. Considering these impacts, the importance of the local anuran fauna and of the reserve itself, a new inventory of the anurans of FNMX was performed.

MATERIALS AND METHODS

Study site

The FNMX is located in the Municipality of Seropédica, State of Rio de Janeiro, southeastern Brazil (22°43' S, 043°42' W, WGS84) (Figure 1). It is a flat lowland area with an elevation of about 40 m above sea level, with few slopes. FNMX is 4.93 km^2 (493 ha) in size, with an average annual temperature of 25.2 °C. It is composed of secondary ombrophilous forests and eucalyptus plantation (Izecksohn and Carvalho-e-Silva 2001a). The reserve is one of the last remaining forests of the Baixada Fluminense (Fluminense lowlands) and of the plains of the Guandu River (Santos and Lima 1999). The area contains many humid and shaded environments, including several ponds, that present a favorable habitat for amphibians.

Table 1. Anurans found in FNMX in this study (TS) and in the previous study (PS) by Izecksohn and Carvalho–e–Silva (2001a) and their conservation status according to IUCN (2015): LC = Least Concern, EN = Endangered, VU = Vulnerable. *Physalaemus soaresi* is also listed as Critically Endangered by ICMBIO (2014).

Species	TS	PS	Conservation status
Aromobatidae			
Allobates olfersioides (Lutz, 1925)	–	X	VU
Bufonidae			
Rhinella icterica (Spix, 1824)	–	X	
Rhinella ornata (Spix, 1824)	X	X	LC
Hylidae			
Dendropsophus anceps (Lutz, 1929)	X	X	LC
Dendropsophus bipunctatus (Spix, 1824)	X	X	LC
Dendropsophus berthalutzae (Bokermann, 1962)	–	X	LC
Dendropsophus decipiens (Lutz, 1925)	X	X	LC
Dendropsophus elegans (Wied-Neuwied, 1824)	X	X	LC
Dendropsophus meridianus (Lutz, 1954)	X	X	LC
Dendropsophus aff. *oliveirai*	X	X	–
Dendropsophus pseudomeridianus (Cruz, Caramaschi & Dias, 2000)	X	X	LC
Dendropsophus seniculus (Cope, 1868)	–	X	LC
Hypsiboas albomarginatus (Spix, 1824)	X	X	LC
Hypsiboas faber (Wied-Neuwied, 1821)	X	X	LC
Hypsiboas semilineatus (Spix, 1824)	X	X	LC
Ololygon argyreornata (Miranda–Ribeiro, 1926)	X	X	LC
Scinax alter (Lutz, 1973)	X	X	LC
Scinax similis (Cochran, 1952)	X	X	LC
Scinax x-signatus (Spix, 1824)	–	X	LC
Trachycephalus nigromaculatus Tschudi, 1838	X	X	LC
Sphaenorhynchus planicola (Lutz & Lutz, 1938)	X	–	LC
Leptodactylidae			
Adenomera marmorata Steindachner, 1867	X	X	LC
Leptodactylus fuscus (Schneider, 1799)	X	X	LC
Leptodactylus latrans (Steffen, 1815)	X	X	LC
Leptodactylus mystacinus (Burmeister, 1861)	–	X	LC
Leptodactylus natalensis Lutz, 1930	–	X	LC
Leptodactylus spixi Heyer, 1983	X	X	LC
Physalaemus signifer (Girard, 1853)	X	X	LC
Physalaemus soaresi Izecksohn, 1965	X	X	EN
Microhylidae			
Arcovomer passarellii Carvalho, 1954	X	X	LC
Chiasmocleis lacrimae Peloso, Sturaro, Forlani, Gaucher, Motta & Wheeler, 2014	X	X	EN
Stereocyclops parkeri (Wettstein, 1934)	X	X	LC
Phyllomedusidae			
Pithecopus rohdei (Mertens, 1926)	X	X	LC

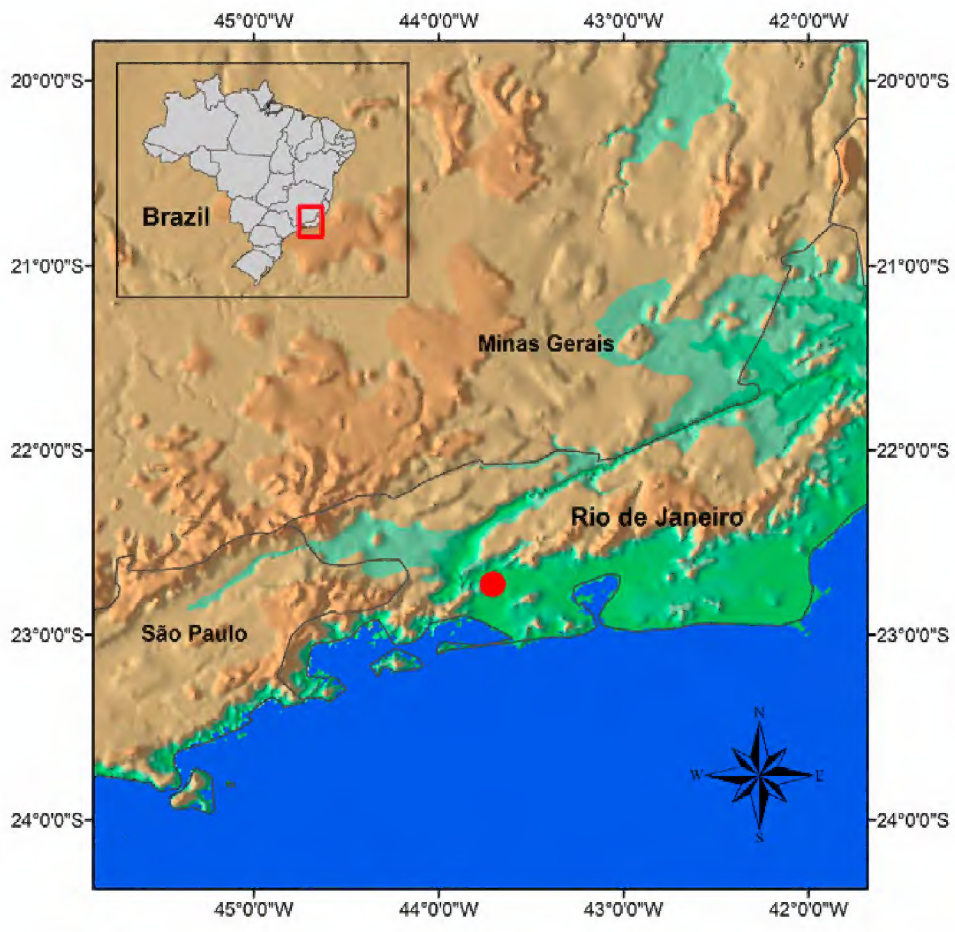

Figure 1. Location of the Floresta Nacional Mário Xavier (red dot), Municipality of Seropédica, State of Rio de Janeiro, southeastern Brazil.

Data collection

Twelve excursions to FNMX were made between February 2010 and January 2011, covering all months except July. Another excursion was made in April 2012. All these excursions involved at least four collectors, and lasted at least eight hours each, totaling more than 416 hours of sampling effort. Searches for tadpoles and diurnal species were performed during daylight (approximately 14:00 h – 18:00 h) and nocturnal species were searched for from sunset to at least 22:00 h. Tadpoles were captured with dipnets and adults were collected by hand. Specimens were collected under SISBIO permit number 21952. Specimens were euthanized, fixed, and deposited in the Amphibian Collection of the Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro (ZUFRJ), Voucher specimens are listed in Appendix A.

Six main sampling areas, covering ponds and the best-preserved areas, were chosen and sampled during all excursions (Figure 2). Environments outside these areas consist mainly of dry open areas and Eucalyptus plantations. These drier environments were also sampled, but with less effort. This scheme ensured sampling in several microhabitats, such as temporary and permanent ponds, forest borders, humid and dry litter. Collected data were compared to previous published inventories of similar areas, including Izecksohn and Carvalho-e-Silva (2001a) from the same area, and the Sorensen similarity index was calculated (Sorensen 1948).

RESULTS

Twenty-six species belonging to five families were found: Bufonidae (one species), Hylidae (15 species), Leptodactylidae (six species), Microhylidae (three species) and Phyllomedusidae (one species). Table 1 shows all species recorded in this study, plus those reported by Izecksohn and Carvalho-e-Silva (2001a).

Scinax alter and *Dendropsophus elegans* (Figure 3) were the most common species, found on all excursions. Five

Figure 2. Area of the Floresta Nacional Mário Xavier (red polygon) and the six main sample areas (green circled), numbered from 1 to 6. Source: Google Maps.

species were recorded in only one excursion, among them the explosive breeders *Chiasmocleis lacrimae*, *Stereocyclops parkeri* (Figure 4) and *Trachycephalus nigromaculatus* (Dias et al. 2010; Targino and Pombal Jr. 2011; Bittencourt-Silva and Silva 2013). The other two species, *Hypsiboas faber* and *H. semilineatus,* common species in other areas (e.g., Almeida-Gomes et al. 2008; Carvalho-e-Silva et al. 2008; Salles et al. 2009), were rare in FNMX. Almost all species were found in all sampled areas, except those recorded in only one excursion. Therefore, there were no differences in species composition between areas within FNMX. Although some ponds have different characteristics than others (shallower or deeper, more or less marginal vegetation), all species appear to occur in all areas.

The Sorensen similarity index between this inventory and Izecksohn and Carvalho-e-Silva (2001a) is 93.5%. *Sphaenorhynchus planicola* (Figure 5) was recorded only in this study. Twenty-five species were recorded in both studies: *Dendropsophus anceps* (Figure 6), *D. bipunctatus* (Figure 7), *Dendropsophus* aff. *oliveirai*, *D. decipiens* (Figure 8), *D. elegans*, *D. meridianus* (Figure 9), *D. pseudomeridianus*, *Hypsiboas albomarginatus* (Figure 10), *H. faber*, *H. semilineatus*, *Ololygon argyreornata*, *Pithecopus rohdei*, *Rhinella ornata*, *Scinax alter*, *S. similis*, *Trachycephalus nigromaculatus*, *Arcovomer passarellii* (Figure 11), *Chiasmocleis lacrimae*, *Stereocyclops parkeri*, *Adenomera marmorata*, *Leptodactylus fuscus* (Figure 12), *L. latrans* (Figure 13), *L. spixi*, *Physalaemus signifer* and *P. soaresi* (Figure 14).

DISCUSSION

Several differences can be noted between the anuran fauna recorded in this study and that found by Izecksohn and Carvalho-e-Silva (2001a) (Table 1). *Sphaenorhynchus planicola*, recorded only in this study, represents a new record in FNMX. According to Izecksohn and Carvalho-e-Silva (2001a), this species was encountered nearby, but not within FNMX limits. *Sphaenorhynchus planicola* typically inhabit deep swamps and permanent ponds in open areas or forest borders (Lutz 1954; Cochran 1955; Izecksohn and Carvalho-e-Silva 2001b; Silva-Soares et al. 2010) and are tolerant to disturbed environments (IUCN 2015). Changes in the characteristics of ponds in FNMX from the 1980s to 2012 may have made these ponds a good environment for this species, but this needs confirmation.

Seven species recorded by Izecksohn and Carvalho-e-Silva (2001a), were not found in this study (Table 1). In the previous study, one female of *Rhinella icterica* was found, but the authors reported that its occurrence was probably due to discarded individuals from a nearby business that used this species for livestock pregnancy tests (Izecksohn and Carvalho-e-Silva 2001a). Since this business no longer exists, the absence of this species is expected. Another missing species, *Allobates olfersioides*, is listed as Vulnerable by IUCN (2015) and its disappearance from FNMX is congruent with reports of declining and disappearing populations from other sites (Weygoldt 1989; Izecksohn and Carvalho-e-Silva 2001b; Gasparini et al. 2007). The absence of *Dendropsophus berthalutzae*, *D. seniculus*, *Scinax x-signatus*, *Leptodactylus mystacinus* and *L. natalensis* could not be explained. However, high-amplitude fluctuations in populations are common in amphibians, and environmental degradation can cause local extirpations of species (Pechmann et al. 1991).

Of the 26 species found in this study, 23 are listed as Least Concern by IUCN (2015). Of the other three, one species (*Dendropsophus* aff. *oliveirai*) could not have its specific status determined, because it is a new species. The other two species, *Chiasmocleis lacrimae* and *Physalaemus soaresi*, are listed as Endangered by IUCN (2015). Until 2010, the report of 12 individuals of *Physalaemus soaresi* from Barro Branco, Municipality of Duque de Caxias, was the only report of this species outside FNMX (Izecksohn and Carvalho-e-Silva 2001a; Pontes et al. 2010). In 2009, a single female was found in a pitfall trap at Serra do Mendanha, Municipality of Rio de Janeiro, 25 km from FNMX (Pontes et al. 2010). Because no other individual has been found since then and because Serra do Mendanha has been sampled since 2002 (Pontes et al. 2010), the potential for a stable population at this locality must be verified. In both cases, the conservation status of *Physalaemus soaresi* would remain Endangered [IUCN criteria B1ab(iii)+2ab(iii)], and both Serra do Mendanha and FNMX must be protected in order to ensure the survival of populations of this species. The same viewpoint about the conservation status is shared by the List of Brazilian

Figures 3–8. Some of the species found in FNMX. **3:** *Dendropsophus elegans*. **4:** *Stereocyclops parkeri*. **5:** *Sphaenorhynchus planicola*. **6:** *Dendropsophus anceps*. **7:** *Dendropsophus bipunctatus*. **8:** *Dendropsophus decipiens*.

Fauna Threatened with Extinction (ICMBIO 2014) that listed the species as Critically Endangered.

There are few inventories published on amphibians of rainforest remnants of the Fluminense lowlands. A study at Reserva Particular do Patrimônio Natural Campo Escoteiro Geraldo Hugo Nunes (Natural Private Reserve Campo Escoteiro Geraldo Hugo Nunes, CEGHN) reported 40 species in 10 anuran families (Silva-Soares et al. 2010). The CEGHN is a private conservation unit of 0.452 km^2 (45.2 ha) located in the Municipality of Guapimirim, about 70 km from FNMX. CEGHN and FNMX share 20 species (43.5% of the total; Sorensen similarity index = 61.5%). Other amphibian inventories from the Fluminense lowlands areas reported a larger amplitude

Figures 9–14. Some of the species found in FNMX. **9:** *Dendropsophus meridianus*. **10:** *Hypsiboas albomarginatus*. **11:** *Arcovomer passarellii*. **12:** *Leptodactylus fuscus*. **13:** *Leptodactylus latrans*. **14:** *Physalaemus soaresi*.

of species (e.g., Morro de São João, 640 ha. and 16 species, Almeida-Gomes et al. 2008; Rio das Pedras reserve, 1.361 ha. and 41 species, Carvalho-e-Silva et al. 2008; Parque Natural Municipal da Taquara, 20.140 ha. and 50 species, Salles et al. 2009). These sites are composed of varied habitats, with topography and environment composition very different from that of FNMX, and comparisons between them are uninformative.

Although FNMX has a relatively small area and low heterogeneity, its preservation is of high importance, considering the anuran fauna found there and the high level of anthropic impact. Long term monitoring surveys on anuran populations are necessary, as well as studies that might explain the disappearance of species found

in the previous inventory (Izecksohn and Carvalho-e-Silva 2001a), but not in this study. Special effort must be made to ensure the survival of *Physalaemus soaresi*, due to its conservation status and possible threat.

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APPENDIX

Voucher specimens from Floresta Nacional Mário Xavier housed in the Amphibian Collection of the Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro (ZUFRJ).

Adenomera marmorata: ZUFRJ 13402; *Arcovomer passarelli*: ZUFRJ 11374; *Chiasmocleis lacrimae*: ZUFRJ 12463-67; *Dendropsophus anceps*: ZUFRJ 11862-64, 11963, 12124, 12230-31, 12448, 12458, 12704; *Dendropsophus bipunctatus*: ZUFRJ 11920-22, 11961-62, 12125, 12362; *Dendropsophus decipiens*: ZUFRJ 11933-34, 11936-39, 11958, 11974, 12017, 12136, 12232-33, 12481, 12712-13; *Dendropsophus elegans*: ZUFRJ 11911-14, 12130, 12360, 12365, 12468-70, 12706; *Dendropsophus meridianus*: ZUFRJ 12363, 12378, 12389, 12390, 12450-51, 12480, 12548, 12658, 12660, 12663-64; *Dendropsophus* aff. *oliveirai*: ZUFRJ 12367, 12369, 12370, 12715; *Dendropsophus pseudomeridianus*: ZUFRJ 12661; *Hypsiboas albomarginatus*: ZUFRJ 11916, 11965-68, 12128, 12359; *Hypsiboas faber*: ZUFRJ 12703; *Hypsiboas semilineatus*: ZUFRJ 12673; *Leptodactylus fuscus*: ZUFRJ 11944-50, 12456, 12669-70; *Leptodactylus latrans*: ZUFRJ 11953; *Leptodactylus spixi*: ZUFRJ 12446, 12457, 12489, 12492-98, 12671, 12694; *Ololygon argyreornata*: ZUFRJ 11924, 11928-29, 12132-33, 12447, 12475, 12526-27, 12529-30, 12532, 12672; *Pithecopus rohdei*: ZUFRJ 12121-22, 12693; *Physalaemus signifer*: ZUFRJ 12358, 12361, 12371-72, 12460-62, 12499-02, 12707; *Physalaemus soaresi*: ZUFRJ 12449; *Rhinella ornata*: ZUFRJ 12453; *Scinax alter*: ZUFRJ 11908-10, 12014-16, 12364, 12482-84, 12677; *Scinax similis*: ZUFRJ 11960, 12485-88, 12517-18, 12522, 12524, 12705; *Sphaenorhynchus planicola*: ZUFRJ 12011-13, 12126-27, 12229; *Stereocyclops parkeri*: ZUFRJ 12444,12455; *Trachycephalus nigromaculatus*: ZUFRJ 13756-57.